Anterior Tooth Challenges, Part 4

*Canines in the Lateral Position*

**INTRODUCTION**

At the start of the classic 1960s television show *The Twilight Zone*, we see a clock floating through black empty space. The unmistakable voice of the show’s creator, Rod Serling, states that *time* is the hidden dimension; the unknown. Without knowing what will happen in the future, we cross over into *The Twilight Zone*.

Often, dentists do not consider the progression of *time* in their approach to a patient. A compromised treatment plan or a poor choice of treatment (often dictated by the patient) usually leads to more serious problems years down the road. If we could only predict what will happen in time, some of the choices we make would be so much easier.

However, dentistry is quite predictable if we respect the tried and true principles of function and aesthetics. Every dental student receives a typodont study model replicating the form of ideal teeth. All dental students are taught the principles of a balanced occlusion and the importance of reducing destructive forces to the dentition.

This article will illustrate what happens when the elements of time and aging are not considered when making a treatment choice. Very often, something that patients do not see, think is unimportant, or say that doesn’t bother them, may come back to haunt them later in life.

If we, as dentists, take the approach that people want to look like other humans, and if we plan our cases to the parameters of the typodont study model, our treatment plans become far more predictable through the progression of time. The case presented herein concerns a patient born with congenitally missing lateral incisors. As a teenager, her canines were orthodontically repositioned into the lateral position. At that time, she was young and attractive, and, like many others, believed that she would have “eternal youth.” Little did she realize that aging does happen to everyone; she was about to cross over into *The Dental Twilight Zone*.

**The Missing Lateral Incisor**

It has been reported that approximately 2% of today’s population is congenitally missing one or both lateral incisors. It is more common for a patient to be missing both laterals, and, when only one is present, it is often a microdent. A panoramic radiograph taken at an early age will enable us to assess if any permanent teeth have not formed.

It is essential to acknowledge if congenitally missing teeth exist when a child is young in order to be able to coordinate a treatment sequence to restore aesthetics and function. The treatment of congenitally missing lateral incisors is both an orthodontic and restorative challenge, based on tooth-to-arch size discrepancy. Numerous articles have been published comparing moving canines mesially into the lateral position versus distalizing the canines to create space to restoratively replace the missing laterals.

If we take the approach that, in 2014, human beings should have a lateral incisor, and that most people want to look like other humans, then it only seems logical to open the appropriate space to replace the missing laterals. The typodont study model that we were given in dental school most definitely has lateral incisors present.

Moving a canine orthodontically into the lateral position can create several aesthetic and functional compromises:

- The canine is a wide tooth, now replacing a lateral incisor, which is a narrow tooth. The canines are generally darker than the laterals, and their color looks out of place when not in their usual position at the corner of the smile.
- The gingival levels of the canines are normally equal to that of the central incisors, resulting in visual disharmony if they are in the lateral position.
- The patient’s occlusion and articulation are inefficient because there is no canine guidance as the upper and lower canines do not align to work together.
- As there is no canine protection, there is an increase in the amount of wear to all the other teeth, usually resulting in abrasions and microfractures. Throughout time, periodontal problems and sensitivity may result.

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- Retention of the canine in the lateral position may require the long-term wear of an orthodontic retainer.
- The patient may begin to display temporomandibular joint (TMJ) symptoms, muscle tension, tooth grinding, and headaches; this is due to a compromised envelope of motion as the facial muscles are not responding in the manner in which they were intended.
- The labial tissue and bony prominence associated with the canines does not look natural adjacent to the central incisor. Not having the protuberance at the corners of the mouth does not offer adequate facial support, resulting in a dished-in face and narrow buccal corridors. Throughout time, fewer teeth become visible when the patient smiles.

Orthodontic Vision

Historically, orthodontists were not accustomed to dealing with patients requiring restorative intervention, as they usually were treating younger patients. Adolescents generally require little or no restoration. However, in the 21st century, orthodontics is often used to treat patients with restorative and/or periodontal requirements. A missing lateral incisor is a restorative need, and the orthodontist should view it as such.

The objectives of orthodontic treatment are often different for the restorative versus the nonrestorative patient:

1. The teeth may have to be positioned by the orthodontist to facilitate a specific restoration such as a missing lateral incisor or other missing teeth.
2. Some teeth may benefit by being permanently restored or provisionalized before, during, or after orthodontics. This restores their proper form, allowing the orthodontist to have a better vision of the required space and dimension. Worn, fractured, or abraded teeth and misshapen and malformed teeth such as peg laterals, narrow incisors, etc., are candidates for preorthodontic restoration.
3. Orthodontics may be required to correct tooth malposition that compromises oral hygiene.
4. Orthodontics may be performed for elective or nonselective periodontal reasons, such as uneven gingival margins, missing papilla, or even periodontal bone loss.

Today’s objectives of orthodontic therapy have changed significantly during the years, as orthodontists have expanded their aesthetic and functional vision. Well-planned orthodontics has the ability to establish a stable and functional occlusion, enhance the health of the periodontium, and improve dental and facial aesthetics. Orthodontists must learn facial aesthetics! Orthodontic literature, research, and training historically emphasized the final occlusal result following orthodontic treatment. However, in the past, there was little emphasis placed on periodontal health and facial and tooth aesthetics. A successful orthodontic result not only constitutes how the final models articulate with each other (as well as achieving an ideal cephalometric relationship and measurements)—it is essential for the patient's facial form to adapt and be in aesthetic harmony with the established tooth position.

Smile analysis must consider the following: (1) vertical placement of the anterior teeth at rest and smiling, (2) transverse (horizontal) smile dimension, (3) smile arc characteristics, and (4) vertical relationship of the gingival margins to each other. All things considered, it is preferable to place the canines in their natural position and prosthetically replace the laterals.

Interdisciplinary Treatment Planning

Advancements in aesthetic dentistry have led to advancements in all of the dental specialties. Facially generated treatment planning, in which the patient’s face dictates treatment, is today’s new dental standard. Every treatment plan begins by considering aesthetics first. We must reference the patient’s lips, skin, cheeks, etc. We must always reference the maxillary tooth position and gingival levels relative to the face and determine how they must be changed. We cannot establish occlusal issues until we determine our final vision of aesthetics. Aesthetics will dictate where to put the teeth, establishing the vertical position, pathways of guidance, and the edge-to-edge position.

The restorative dentist is the team leader (quarterback), communicating what is required of the specialty teams. He or she must (1) establish realistic treatment objectives (economics, expectations), (2) create the aesthetic vision of the final outcome, (3) determine the sequence of treatment, and (4) build up malformed teeth to ideal proportions. The restorative dentist becomes the liaison among all the required specialists, interacting with them throughout treatment to ensure that their work satisfies the restorative requirements.
CASE REPORT
Diagnosis and Treatment Planning
A 40-year-old patient presented (in 2003), requesting cosmetic dentistry in an attempt to mask a dental condition that was created when she was a teenager.

Born with missing lateral incisors, she underwent orthodontic treatment at age 14 in order to correct the problem. Trusting the orthodontist, and not having been presented with any other treatment options at the time, her parents chose (or allowed) to have her canines orthodontically repositioned into the lateral position. After orthodontic treatment, her smile never seemed quite right, but she was able to accept it. However, as she approached middle age, she felt as if people looking at her face always seemed to be focusing on her teeth. This made her feel very self-conscious. Her canine was dark, had a round and pointy contour, and had gingival levels not in harmony with the other anterior teeth. The buccal corridors had been narrowed in order to close the missing spaces, leaving her feeling as if her cheeks were pushed in (Figures 1 and 2). When she looked in the mirror, she felt that she looked older than she should. She was desperate!

Changes in dental techniques and materials have rapidly advanced by the turn of the 21st century. The possibilities and benefits of aesthetic dental procedures became routinely profiled in the media. She sought our advice on how to create a more harmonious and natural smile. Should we attempt to go back in time and realign the canines to their proper position and replace the laterals? The patient was open to all options.

After weighing all the treatment choices, we chose not to move the canines back into their natural position to create space for placing titanium implants in the lateral positions. Although it might have been a more common way to proceed, we felt that we would really have nothing to gain by going this route. Treatment would last approximately 18 months, and there would always be the possibil-
The further option of placing veneers on the posterior teeth would always be available, if the patient wished. Treatment time was estimated to be approximately 6 months, and would not require full-mouth banding as would a complete orthodontic expansion. It is essential to evaluate all the treatment options as to benefits, risks, cost, and time it would take to do the treatment. The final decisions are always subject to patient approval.

As she clearly desired anterior porcelain veneers, all we had to do was recreate the lateral and canine position. The treatment plan was clear.

Clinical Protocol
The labial surfaces of the canines were flattened, and their mesial and distal contours narrowed using KUT flame-shaped diamond burs (Dental Savings Club) and Lightning interproximal finishing strips (Integra MilTEX).Ormco Saphire brackets (Ormco) were placed on the upper arch to the first molar position (Figure 3). Using Ormco NiTi wire progressively increasing from 0.13 to 0.16 with an extrusion force of 15 g, we introduced elements of torque on the central incisors to labialize them and to extrude the gingival level of the canines (Figure 4). Using orthodontic extrusion to alter soft and hard tissue was first described in the literature by Heithersay13 and Ingbret14 Utilizing low-intensity forces (less than 30 g) stimulates the marginal positioning of the crestal bone, allowing the gingiva to follow it. The alveolus changes position with the movement of the root.15

The canines were extruded 1.0 mm per month for 3 months, followed by a further stabilization period of 3 months with 18 x 25 Ni-Ti wire. The predicted 6-month treatment time was achieved. The gingival levels of the canines were now in position to appear as lateral incisors, with the teeth slenderized and ready to be restored as laterals respecting the golden proportions. Space was left distal to the canines in order to allow the first bicuspids to be modified into the form of canines (Figures 5a to 6). The brackets were then removed, leaving the teeth in ideal position to be restored with conservative feldspathic porcelain veneers (Figure 7).

A vinyl polysiloxane (VPS) impression was taken (Status Blue alginate substitute [DMG America]), and a diagnostic wax-up was done to recreate an ideal form for the 6 anterior teeth (Figure 8). It was decided to assess the aesthetics of the anterior sextant before deciding to expand the posterior buccal corridors at this point in time.

The teeth were conservatively prepared (0.3-mm reduction) (Figure 9), and final impressions taken with a VPS material (Honigum [DMG America]) with a regular- and light-bodied technique. An accurate bite registration was recorded using Luxatube (DMG America). An A1 shade was chosen using the VITA classical Shade Guide (Vident). The prepared teeth were then temporized with Luxatemp shade A1 bis-acryl material (DMG America), using a previously prepared Sil-Tech (Ivoclar Vivadent) VPS putty matrix fabricated from the diagnostic wax-up (Ivoclar Vivadent). The provisions were trimmed and placed in the mouth with Temp Bond Clear (Kerr). Further refinement with fine diamonds and Flexi Discs (Cosmedent) allowed us to achieve a natural looking smile in aesthetic harmony that delighted the patient (Figure 10).

Plaster Geller dies16 were poured using Fuji Rock EP diestone (GC America) (Figures 11a and 11b) and Creation (Jensen Dental) feldspathic porcelain veneers were fabricated using a refractory die technique (Figures 12a and 12b).

The veneers were resin cemented with transparent veneer cement (Variolink Veneer [Ivoclar Vivadent]) in 2004. The patient was delighted. She finally undid the situation that she was born with (Figures 13 and 14). The size and shape of the anterior teeth followed the parameters of the golden proportion, making it difficult to notice that the laterals were congenitally missing. The bicuspids were aesthetically altered to resemble canines. They were placed in group function, wanting to distribute the forces evenly to the posterior teeth and not wanting all the load to be focused on the naturally weak 2-rooted first bicuspids. At this point in time, the slightly collapsed buccal corridors did not bother her at all. She could always expand the posterior teeth at a later time. At last, she loved her front teeth!

With the Passage of Time
Almost 10 years had passed, and in 2013, she still found the look of her front teeth to be aesthetically pleasing. However, the pushed-in posterior teeth (that had never bothered her previously) began to bother her (Figure 15). Aging, and the changes that occur with the passage of time, happens to everyone! It was time to fill in the sides (buccal corridors) of her mouth. The maxillary second bicuspids and first molars on both sides were prepared (Figures 16a and 16b) and an appropriate shade chosen (Figure 17). The new feldspathic restorations (Creation Porcelain) followed the arrangement that had been predetermined a decade earlier (Figure 18). The restorations were permanently placed with transparent veneer cement (Variolink Veneer) for a seamless transition. It was as if all the teeth had been fabricated at the same time (Figures 19 and 20), and the patient was ecstatic with the results.

Closing Comments
People change their minds all the time. Nothing is forever. They change their clothes, jobs, homes, friends, and even their significant others.
How can someone know and predict as a teenager what they will want later in life? A dentist must never lose sight of the fourth dimension: time. A thoughtful treatment plan can future-proof the dental effects of aging. An architect designs a building from the ground up, trying to anticipate every detail. We must design our dentistry in the same way! If we set up our cases ideally, we offer the patient the flexibility of future upgrading, ensuring a happy long-lasting doctor-patient relationship.

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Dr. Mechanic received his bachelor of science (1975) and doctor of dental surgery (1979) degrees from McGill University. Dr. Mechanic maintains membership in numerous professional organizations, including the American Academy of Cosmetic Dentistry, the Academy for Dental Facial Esthetics, the American Society for Dental Aesthetics, and the European Society of Cosmetic Dentistry. He practices aesthetic dentistry in Montreal, Canada. He also is the cofounder of the Canadian Academy for Esthetic Dentistry, program coordinator of the University of Toronto Advanced Restorative Continuum, and is recognized as a Leader in Continuing Education by Dentistry Today. He is the aesthetic editor of Canada’s Oral Health dental journal and is on the advisory board Dentistry Today. His work has been profiled in magazines, on television, and on radio. He can be reached at info@drmechanic.com.

Disclosure: Dr. Mechanic reports no disclosures.

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