Guest Editorial

Orthodontic Intervention and Patients with Down Syndrome

The Role of Inclusion, Technology and Leadership

David R. Musich[a]

According to the Centers for Disease Control and Prevention (January 6, 2006 report) the prevalence of children born with Down syndrome (DS) in the United States is approximately 1:733. At this rate of occurrence, the genetic trait of trisomy 21 (DS) has a prevalence very similar to that of cleft lip and palate. Whereas dentistry and orthodontics have long been committed to the interdisciplinary team management of patients with cleft lip and palate, the dental/orthodontic commitment to patients with DS is less evident. A quick review of the two major orthodontic journals (*American Journal of Orthodontics and Dentofacial Orthopedics* and *The Angle Orthodontist*) illustrates the point—there have only been three articles published related to treatment of patients with DS in the last 25 years. In contrast, for cleft lip and palate treatment and research, during the same time period and for the same key orthodontic journals, approximately 50 articles were published.

Before and particularly since the passage of the Americans With Disabilities Act of 1976, parents of patients with disabilities have sought more inclusion for their children in both the educational setting and the medical setting. One generation ago, a large percentage of children born with DS died early in life because of cardiac problems, and many of those who survived their early medical problems were institutionalized as young children. Most of the current generation of parents of children with DS make a significant effort to include their DS children in many aspects of traditional family life, school, and sports. In addition, better educational mechanisms exist to assist them and their children medically and socially. Medical support groups and parent support groups have been very active in optimizing the quality of life for children with DS. The combination of these changes over the past few decades has led to a 100% increase in the life expectancy of persons with DS (from a previous average life expectancy of 30–40 years to a current life expectancy of 60–70 years).

There are many dental conditions common to children with DS that are well suited for orthodontic intervention and should be considered for correction at the appropriate times.[1,2]

1. Maxillary anteroposterior hypoplasia (54% of DS patients have Angle Class III tendencies);
2. Maxillary transverse hypoplasia (65% of DS patients have posterior crossbites);
3. Congenitally missing teeth (20 times more frequent in DS patients than in the general population);
4. Tooth size discrepancy (high degree of frequency of interference with ideal interarch coordination);
5. Open bite (interfering with proper mastication);
6. Impacted teeth (10 times more canine impactions than the non-DS population);
7. Transposed teeth (15% with Mx.C.P1 transpositions, compared to 0.3% in the general population);
8. Tongue thrust and protrusive tongue posture (muscle hypotonicity and joint laxity are frequently present requiring speech and myofunctional therapy);
9. Gingival excess and periodontal infection;
10. Chewing difficulties leading to frequent choking episodes.

The above conditions benefit from timely orthodontic intervention; frequently, a two-phase or multiphase treatment program is beneficial to assist in early correction of maxillary transverse deficiency and Class III malocclusion. In addition, if a child has more than one of these frequently occurring conditions, advanced interdisciplinary therapy will be required with a well-coordinated and experienced dental team, including critical treatment planning input from the orthodontist.

Technologic advances in orthodontics have made it possible for orthodontists to create a treatment environment that welcomes children with special needs and treatment requirements. The following technologic improvements help all orthodontic patients, but some are specifically useful for patients with DS:

1. Impressions using quick-set materials with fun flavors—these may reduce the tendency for activation of the more sensitive gag reflex frequently experienced with DS patients;
2. Easy bonding of brackets rather than more complex and uncomfortable banding procedures;

[a] Current President of The Edward H. Angle Society of Orthodontists, Inc.

3. Self-etching primer, to reduce the taste of conventional etchants and glass ionomer cements that can be used in the oral environment in which it is difficult to maintain a dry field for several minutes at a time;
4. High-memory wires, allowing a longer activation interval between appointments;
5. Self-ligating brackets, which allow a more patient-friendly activation appointment;
6. Advances in orthognathic surgical techniques that are less invasive and more predictable;
7. Current reliability of implant replacement of congenitally absent teeth, which greatly aids the overall prognosis for patients with DS;
8. Reversible implant anchorage devices to minimize compliance requirements needed for successful tooth movement.

Summary The orthodontic specialist has many treatment management tools and skills to improve the quality of life for the patient born with DS. The use of the new Supplemental History form available through the American Association of Orthodontists (AAO) allows the parents to provide helpful descriptions of details about their child that will allow the dental team to create a health care environment that is more sensitive and comfortable for both the parent and the DS child.

With the technological advances available and the increasing numbers of kids with DS seeking orthodontic care, our orthodontic residency programs need to include training for orthodontic treatment of DS patients similar to the training available for cleft palate team participation. Currently, the AAO's Council on Education is assessing the role of residency programs training future orthodontists to handle the unique needs of patients with DS and patients with other special needs. Doctor and staff training with clinical updates would be made possible at university centers. Through more frequent journal articles and presentations on this subject, orthodontic specialists might become more comfortable setting aside the extra time needed to manage the requirements of children with DS.

The orthodontic specialty is rapidly becoming aware of the need for its leadership in developing an optimal interdisciplinary setting for providing patients with DS with the advanced dental care available and needed to improve the quality of their lives. With many excellent residency programs in North America, one could easily envision orthodontic specialists taking the lead in the development of interdisciplinary DS treatment teams. In turn, those teams could contribute to existing guidelines that would aid in future treatment approaches, which would be specifically designed for the multifaceted dental problems of the DS patient.[2] Although the optimal treatment of DS patients presents complex challenges for orthodontic specialists and their teams, the fulfillment of applying the best available orthodontic skills to help children with DS is uniquely rewarding. Providing the care and enjoying the fulfillment are experiences in which all orthodontists and staff must be adequately trained.

REFERENCES

1. Pilcher ES. Dental care for the patient with Down Syndrome. *Downs Syndr Res Pract.* 1998;5:111–116.
2. Desai SS. Down Syndrome. A review of the literature. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1997;84: 279–285.
3. Cohen I. Health care guidelines for individuals with Down Syndrome. *Down Syndr Q.* June 1996;1(2).