Guest Editorial

On Evidence-based Orthodontics

Robert M. Rubin

The pursuit of evidence-based treatment in orthodontics is a worthwhile goal, but its difficulty should not be minimized. Some of the factors that contribute to the difficulty include the following:

1. Treatment occurs over an extended period of time;
2. The amount of growth and its direction vary enormously among patients;
3. Patient cooperation has a significant effect on outcome;
4. Response to the same orthodontic forces varies among patients;
5. Skeletal morphology can complicate treatment;
6. Parafunctional muscular habits can influence tooth movement;
7. Mode of respiration may influence eruption and growth;
8. Other factors can affect treatment.

Because of this complexity, it is necessary to make midcourse corrections throughout treatment. That makes orthodontics similar to a space launch. During a space shot, midcourse corrections are necessary because the target is moving. In orthodontics, the movement of the target, a good occlusion in an attractive face, is irregular in both amount and direction, requiring that the corrections be made more often.

Several years ago, several orthodontic departments conducted a study on Class II division 1 treatment. One experimental group received headgear and a bite plane, another group received a functional appliance, and a third group was a control group. The results of this attempt to reach an evidence-based conclusion on the relative effectiveness of two treatment approaches were, well, underwhelming. Essentially there were no differences in the outcomes of the two experimental groups. No significant midcourse corrections were possible because they would taint the experiment. As previously noted, good clinical orthodontics requires frequent midcourse corrections, because there are so many unpredictable variations that can occur during treatment. That is one of the reasons that good evidence-based treatment may continue to be elusive. Also, Angle's classification describes only the most superficial characteristics of a malocclusion. The underlying structures may vary markedly, despite the same designation.

For many years, before the scientific era, observation was a major source of therapeutic progress. The cure for smallpox occurred when it was observed that dairy farmers working with cows were immune to smallpox. They had incurred a benign infection of cowpox, and the viruses were similar enough to provide immunity. Penicillin was similarly discovered by accident in a Petri dish. Edward Angle's contributions to modern orthodontics were based largely on keen observation and clever mechanics.

There is a tendency to devalue observation in the scientific era by dismissing it as ''anecdotal.'' I believe keen observation will continue to be an important source of advancement in orthodontics and other complex therapies that are difficult to study with controlled samples. Cleft lip and palate is another anomaly that resists the scientific method because of its complexity and the enormous differences that can be present in patients with the same label, for example, unilateral complete cleft of the lip and palate. A recent article[1] reported on the surgical outcomes of fewer than 50 cases treated at two facial anomalies centers and compared their results. The difference in outcomes was almost certainly attributed to the small size of the treatment groups rather than the difference in the skills of the surgeons at the two centers.

Scientific methods in orthodontics have made enormous advances in the technology of attachments, adhesives, and archwires. It is astonishing that today there is still no consensus on whether orthodontics can influence the growth of the mandible. A recent article,[2] based on a review of the literature, concluded that functional appliances do not permanently influence growth of the mandible. This is a remarkable conclusion because there are reliable reports of functional appliances causing condylar growth in other mammals.[3] Do the authors of the consensus report believe humans are unique in their response to functional appliances? Until we can answer this relatively simple question, I think we should refrain from suggesting that we can identify an evidenced-based method of orthodontic treatment at this time.

REFERENCES

1. Prahl-Andersen B, Qiao J. Quality improvement of cleft lip and palate treatment. *Angle Orthod.* 2006;76:265–268.

2. Huang GJ. Bigfoot. *Am J Orthod Dentofacial Orthop.* 2006; 129:323–324.
3. Rabie ABM, Wong L, Tsai M. Replicating mesenchymal cells in the condyle and the glenoid fossa during mandibular forward positioning. *Am J Orthod Dentofacial Orthop.* 2003; 123:49–57.

Editor's note. Dr Rubin (Robert4370@cox.net) recently retired as an Associate Editor of *The Angle Orthodontist*, a post in which he served with distinction for many years. He also is a past president of The Edward H. Angle Society of Orthodontics Inc.