

Complication and Failure in Orthodontics

by Rolf G. Behrents, D.D.S., M.S., Ph.D

Professor and chairman
Department of orthodontics
University of Tennessee
USA.

Because of the complexity of orthodontics and the nature of health care, numerous complications can occur during treatment. For the most part, though, because of the advanced state of our knowledge and the sophistication of orthodontic technology, many complications can be overcome, when they cannot, treatment compromise or failure can result. Still, even in failure, much can be learned.

The Lessons of Failure

Most practitioners equate failure to that which is deficient, inadequate or anything done imperfectly or attempted unsuccessfully. In this context many examples of complications and failure are easy to cite. First of all, failures can occur which seem to be the fault of no one. For example, root resorption occurs in fact, or by degree, through a seemingly unknown plan. On the other hand, failure induced by patients involving poor or inappropriate cooperations is well recognized as a very important determining factor in the production of disappointing treatment results.

Less discussed and admitted are practitioner failures and their influence on patient care. Practitioners can err in terms of recognizing the

existence, extent, and complexity of a malocclusion, the difficulty of treatment, and complicating medical and dental conditions. Also, practitioners can fail to diagnose the patient problems, adopt an incorrect strategy, fail to execute treatment and retention protocols appropriately, and fail to manage the patient adequately; acts of omission and commission can occur. This wide range of opportunity for failure can produce a wide range of consequences for the patient, from minor malposition of teeth to the other extreme: complete failure of the treatment or compromise of the patient's dental or general health.

Aware of the etiology and context of failures, practitioners can learn much from them, as opportunities to anticipate things that "go wrong" and protocols for avoidance. Once aware, prudent practitioners can elect to employ techniques which minimize or avoid complication and failure.

Failure as Indicator of Expertise

The production of complication (especially if repeatedly produced) and failure can also be used to study and assess levels of expertise. According to accepted definitions, an expert is one who has the ability, acquired by practice, to perform qualit-

atively and quantitatively well tasks in a specific area. It follows then that expertise in orthodontics is built on education and obtained through experience while in school and in practice.

Though a number of studies, the characteristics of expertise have been clarified.

When expertise is obtained, the expert should exhibit certain characteristics. For example, an expert will excel only in a specific task area. In the context of orthodontics, an orthodontist who has obtained a high level of expertise in orthodontics should not expect to play chess particularly well without developing expertise in that area also; expertise does not transfer. An expert will also solve problems quicker and with fewer failures than a non-expert. An expert orthodontist should complete treatments more efficiently and with better results than a novice.

Experts may have superior short and long-term memory; they even be more intelligent than novices. They are able to arrange and store meaningful information pertinent to their area of interest. As a result, experts can search and retrieve information more appropriately and efficiently for application to new problems. Expert orthodontists often can remember and describe, in great detail, problems cases which they encountered decades before. Experts also want to understand matters in a comprehensive, as opposed to a narrow or superficial fashion; when they decide to study a topic they tend to penetrate the topic as much as skill, time, and energy allow. Importantly, experts are flexible and open to new ideas. In terms of quantity of information, experts have stored a great deal of knowledge on the bank. Expert orthodontists should be those who have gone to school, have large libraries, read journal articles, attended many C.E. courses, attended meetings, and applied the knowledge gained in their practices.

When experts view their tasks, they perceive a large number of meaningful patterns. These patterns are more often based on abstract (rather than superficial) features of a problem. Once perceived, these patterns form the basis for general

(rather than specific) rules or principles which they use to develop strategies for solving problems. An expert in orthodontics would realize there are many types of Class II malocclusion each relating to a certain type of treatment; a novice might believe that there is only one type of Class II malocclusion which is amenable to only one treatment.

Experts see, represent, describe, and solve problems at a deeper more principled level than novices. When confronted with a problem, experts spend more time, and energy, trying to define understand, and structure a problem and less time solving it; experts think in a forward direction from problem to solution; and, the problem is related to the solution by plan. With novices, a plan might be absent because novices think backward in that they focus on appliances and try to apply them to all problems. In orthodontics, the differences noted here can be seen by viewing the literature authored by experts and novices. An article written by a novice orthodontist often contains a brief, superficial description of a problem encountered in orthodontics followed by a few (or no) words about treatment planning which is then followed by extensive subscriptions of an appliance that is supposedly unique and can do it all. Proof of being able to do it all, though, is usually weakly demonstrated by a few, highly selected, case reports. Although amused, expert orthodontists often find it difficult to read such articles and are quick to make negative comments such articles.

As opposed to simple problems, experts would be expected to out-perform novices in dealing with ill-structured, complex problems (e.g., whether to go to the store for milk is a simple problem; whether to go to war is a complex, ill-structured problem). In dealing with ill-structured problems the expert must know how the problem can be broken down into smaller units, which variables are relevant or irrelevant, how variables are commented, ordered or otherwise patterned, the long term effects of any action, and how dynamic events should be dealt with. They must function in a situation where each

party involved in a problem might have different goals, all of which must be satisfied. They must formulate a complex plan, revise the plan as is necessary, solve problems along the way, and accomplish the best result possible. Orthodontic problems are often complex and ill-structured. For example, orthodontic problems are not generally singular and all aspects of such a problem must be dealt with (e.g., poor cooperation, unfavorable growth) during treatment; and parents, patients, and practitioners each have more-or-less different goals (the parents want the cheapest but best service, the patient wants great esthetics, and the practitioner wants things like good functions).

Experts are more aware reflective. They are of their abilities and limitations through self-analysis and aware of the limitations of others. Experts can assess the complexity of problems particularly where complexity exists. Experts can determine that solutions will be difficult particularly when such is true.

Furthermore, experts understand and appreciate uncertainty particularly when uncertainty exists. As such, experts are seen to engage in activities where they attempt to synthesize their view of various problems or solutions so they might unify thought and interpret new and old experiences. They often must speculate beyond the limits of knowledge and they prescribe in that they seek to establish standards such as what is meant by good, bad, right, wrong, beautiful, and ugly.

Expert orthodontists then would be expected to realize their personal imperfections and those speciality regarding the state of our knowledge and our capabilities.

Expert orthodontists would continually learn from their experiences, would be expected to attempt new treatments, and would try to establish, through some manner of research, whether methodologies were efficient and effective, or not.

Conclusions

It is valuable at the first level, to understand that

failures provide opportunities for study. While embarrassing to practitioners, there is much to be learned. The study of failure in this context will also demonstrate the limitations of the speciality of orthodontics as well.

The production of complication and failure can also help us assess level of expertise. In this context it is important to know what an expert is and how practitioners can aspire to greater levels of expertise. Experts are associated with a quality performance, but they also make mistakes. But, in doing so, they differ from novices in knowing how to profit from them. Finally in its broadest context, failure can also relate to deceit, neglect, or disappointment. In this context failures can be measures of ethical deficit.

Orthodontics can never be wholly successful, but the portion that is not can be made smaller.

Resources:

- A.A.O. issues special bulletins on extraoral appliance care Editorial. *American Journal of Orthodontics* 1975; 68: 457.
- Baker, G.A.: Why do we have orthodontic failures? *American Journal of Orthodontics and Oral Surgery* 1939; 25: 30-2.
- Behrents, R.G.: Iatrogenic problems associated with the clinical practice of orthodontics. In: *Orthodontic Treatment: The Management of Unfavorable Sequelae*. McNamara, JA and Trotman, CA (eds). Volume 31: *Craniofacial Growth Series*. The University of Michigan Center for Human Growth and Development: Ann Arbor, 1996. Pages 1-28.
- Behrents, R.G.: Iatrogenics in Orthodontics, *The American Journal of Orthodontics and Dentofacial Orthopedics*, 1996; 110: 235-8.
- Booth-Mason, S. and Birnie D.: Penetrating eye injury from orthodontic headgear-A case report. *European Journal of Orthodontics* 1988; 10: 111-4.
- Burrill, J.A.: Why do we have orthodontic failures? *American Journal of Orthodontics and Oral Surgery* 1939;25:33-9.
- Chi, M.T., Glaser, R., and Farr, M.J.: *The nature of expertise*. Hillsdale NJ: Erlbaum, 1988.
- Graber, T.M.: Postmortems in posttreatment adjustment. *American Journal of Orthodontics* 1966;52:331-52.
- Harris, E.F. and Baker, W.C.: Loss of root length and crestal bone height before and during treatment in adolescent

- and adult orthodontic patients. *American Journal of Orthodontics and Dentofacial Orthopedics* 1990;98:463-9.
- Hellman, M.: Failure in orthodontic treatment. *International Journal of Orthodontics and Oral Surgery*, 1936:22: 343-60.
- Holland, G.N., Wallace, D.A., Mondino, B.J., Cole, S.H., and Ryan, S.J.: Severe ocular injuries from orthodontic headgear. *Archives of Ophthalmology* 1985;103:649-51.
- Huber, P.W.: Galileo's revenge: Junk science in the courtroom. USA: Basic Books, 1991.
- Hultgren, B.W., Isaacson, R.J., and Frensch, P.A.: Does practice make perfect...or permanent? *Angle Orthodontist* 1994;64:231-236.
- Larson, E.: Dummy and finger sucking habits with special attention to their significance for facial growth and occlusion. *Swedish Dental Journal* 1972;65:635-42.
- Little, R.M.: Stability and relapse of dental arch alignment. *British Journal of Orthodontics* 1990;17:235-41.
- McNamara, J.A., Selignan, D.A., and Okeson, J.P.: Occlusion, orthodontic treatment, and temporomandibular disorders: A review. *Journal of Orofacial Pain* 1995;9:73-89.
- Mershon, J.V.: Failures. *International Journal of Orthodontics and Oral Surgery*. 1936;22:338-42.
- Meskin, L.H.: Non-maleficence: Do no harm! *Journal of the American Dental Association* 1992;123:8-11.
- Mirabell, A.D. and Artun, J.: Prevalence and severity of apical root resorption of maxillary anterior teeth in adult orthodontic patients. *European Journal of Orthodontics* 1995;17:93-9.
- Morreim, E.H.: Ethical issues in scope of practice. In: Proceedings of the Orthodontic Educational Development Symposium. Roberts, W.E., R.A. White, and W.C. McGaghie, W.C. (eds.). American Association of Orthodontists, St. Louis. pp. 104-112, 1995.
- Pitts, W., Pickrell, K., Quinn, G., and Massengill, R.: Electrical burns of lips and mouth in infants and children. *Journal of Plastic and Reconstructive Surgery* 1969;44:471-9.
- Pollock, H.C.: Iatrogenic orthodontics. *American Journal of Orthodontics* 1962; 48:770-3.
- Rogers, A.P.: Orthodontic Failure. *International Journal of Orthodontics and Oral Surgery*. 1936;22:335-7.
- Seel, D.: Extraoral hazards of extraoral traction. *British Journal of Orthodontics* 1980;7:53.
- Smith, R.J.: Ethical concerns in scope of practice: Discussion. In: Proceedings of the Orthodontic Educational Development Symposium.
- Roberts, W.E., R.A. White, and W.C. McGaghie, W.C. (eds.). *American Association of Orthodontists, St. Louis*. pp. 113-116, 1995.
- Sternberg, F.J.: *The triarchic mind*. USA: Penguin Books, 1988.
- Sternberg, R.J.: *Advances in Psychology of human intelligence*. Hillsdale Nj: Erlbaum, 1989.
- Sternberg, R.J. and Frensch, P.A.: *Complex problem solving principles and mechanisms*. Hillsdale HJ: Erlbaum, 1991.
- Strang, R.H.: The analysis of a complicated case unsuccessfully treated. *American Journal of Orthodontics and Oral Surgery* 1939;25:330-7.
- Stuteville, O.H.: Injuries caused by orthodontic forces and the ultimate results of these injuries. *American Journal of Orthodontics and Oral Surgery* 1938;24:103-119.
- Trik, T.M.: Limitations in Orthodontic Treatment. *Angle Orthodontist* 1965;35:165-77.
- Tuncay, O.C., and Reeves, G.A.: "patient" patient: 22 years in bands. *American Journal of Orthodontics and Dentofacial Orthopedics* 1995;108:571-82.
- Wagh, L.M.: Why do we have orthodontic failures? *American Journal of Orthodontics and Oral Surgery* 1939;25:40-8.
- weinberger, B.H.: Medical Problems relating to orthodontia. *American Journal of Orthodontics and Oral Surgery*. 1938;24:213-34.
- Woods, F.R.: A word about failures. *International Journal of Orthodontia*. 1915;1:510-2.

