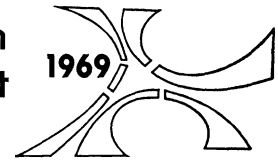
The Role of Orthodontics in Treatment Management of Cleft Lip and Palate



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Nearly 40 years ago, after the completion of my medical and dental education, I began general surgical training and had the opportunity to visit clinics in other parts of Europe. In Berlin, in 1932, while visiting the well-known German plastic surgeon Professor Ernst, I assisted in my first palatal closure. From there I proceeded to Düsseldorf where I spent some months at the West German Clinic for Maxillo Facial Surgery. In those days such operations were performed using either local anesthesia or general anesthesia with ether. This made the procedures difficult. Since that time the advances in plastic and oral surgery made possible by the development of antibiotics and modern techniques in anesthesia have been astounding.

But consider the various operative techniques, from primary lip closure neonatally, and primary bone grafts, to the deferring of surgery until the 3rd or 5th year of life, if not longer. Doesn't one receive the impression that the results have been less than satisfactory? Who judges these treatment procedures as to their worth and efficacy? These are some of the questions one must ask when evaluating today's cleft palate surgery. And in doing so, other questions are raised. Is the state of affairs similar in orthodontics? Are the results of our cleft palate treatment as good or at least comparable to those of our everyday cases? Or, have developments in plastic and restorative surgery made orthodontic treatment unnecessary or relegated it to the number two or number three position on the a cleft palate team?

Reading some of the recent literature, one should receive this impression. Pruzansky (*5*) wrote in 1964:

> The present generation of treated patients does not present the maxillary deformity that was untreatable by conventional orthodontic means. In fact many of our patients will not require any orthodontic treatment or a minimal amount for the purposes of rotating teeth adjacent to the cleft.

If this were true, I could end my discussion here and conclude that ortho-

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dontists are not important in the cleft team. But Pruzansky goes on to say:

> Nor does collapse of the arches preclude rapid, complete and relatively inexpensive correction of arch form in the deciduous, mixed, or permanent dentition.

Here is where our views on orthodontic treatment widely diverge.

Perhaps it is correct not to overestimate the role of orthodontics, and this is true when one thinks of orthodontics in its pure mechanical form where the orthodontist begins his tooth movement after the permanent teeth have erupted. At this stage of development, he sometimes must be content with preparing the dental arches so that the surgeon can perform his secondary bone grafting, anterior displacement of the whole maxilla, mandibular osteotomies, or combinations of these. The orthodontist can also facilitate the work of the prosthodontist. So considered, he becomes the servant of the surgeon or prosthodontist.

However, when we broaden the scope of orthodontics to include *interceptive* orthodontics, the picture is quite different. Then the term *orthodontics* itself becomes inaccurate, or at least insufficient. Orthodontics is only part of a broader field which might be termed maxillary orthopedics.

General orthopedics on the human skeleton uses both a conservative approach with appliances, and a surgical approach in its therapy. This is exactly how cleft palate cases are treated, both surgically and orthopedically with appliances. In this sense maxillary orthopedics is not a small facet of cleft palate therapy, but actually encompasses the whole of it.

Orthodontics has concerned itself for decades with the following problems which are also necessary for cleft palate treatment. These problems are: a) growth and development of the jaws, b) the influence of soft tissue on teeth and jaws, c) the influence of the oral musculature, especially the tongue, on tooth position and occlusion, d) premature contacts and mandibular deflection, e) occlusion and temporomandibular joint, f) malocclusion and speech defects, and g) tooth movement and reaction of bone.

Reports of attempts to solve these problems fill international orthodontic journals. Some problems are solved or at least are brought closer to being solved. Some of the findings do already influence our therapeutic methods. But in many areas we are still in the process of gathering data and evaluating it empirically. This is where the greatest problems and difficulties in orthodontic progress lie. Every case requires many years of observation, since results can be accepted as valid only when growth has ceased. Even pretreatment case analyses can be complicated. Overtly similar cases can be based on different genetic and environmental factors. Separating and evaluating these can be a difficult

task. Even more difficult for the orthodontist are the conditions inherent in cleft palate work. The observation and care of these cases extend not over a few years, but over 20 years, or two decades: from birth until completion of growth.

When considering all the various types of clefts, from partial cleft lips to complete bilateral clefts, one sees that it takes time to collect sufficient material on each type for longitudinal studies. To gather enough material at a cleft palate center may take from 5 to 10 years. Another 15 to 20 years must be allowed for longitudinal studies. This means that a total of 20 to 30 years may be required to reach conclusive results. This is the life work of a man.

The plastic surgeon who operates on an adult can see his result after only a few years. The orthodontist in his limited field, excluding cleft cases, can likewise after a few years observe the outcome of his case. However, he must wait a while longer to see if his result remains stable. The speech therapist can see his result in normal speech defect cases after only a few months. How different are conditions in cleft palate cases! They have to be followed and recorded over *many* years.

In articles concerning cleft palate cases, we see only partial results taken from a rather short period of development. When we inquire as to how these cases fared, or when upon personal examination we see that some of the results are disappointing, we are told that these methods are no longer used or have been modified. The newer methods, we are told, seem to be very promising.

As far as I know, there is no area in medicine as complex and requiring the talents of so many different specialists as cleft palate therapy. And, because this deformity is so prevalent and these unfortunate patients can truly be helped, there is no area in medicine where our efforts are so appreciated and worthwhile. Of course, there are patients with more severe anomalies who must be helped, but in these extreme cases the results to be hoped for are quite limited. Here, medicine has the responsibility of making life livable or perhaps making the continuance of life possible. In the cleft patient, where speech, mastication and esthetics are in disarray, we can make it possible for him to lead a normal life. With our help these patients may be able to reach a social status not unlike that of their normal peers. For this reason the maximum effort on our part is well worthwhile.

What is the role and responsibility of the orthodontist in this complex situation? Let me reiterate: growth, development, tooth eruption, occlusion, function, and even speech.

In normal, not cleft, cases, one or perhaps more of these things may be affected. In cleft cases, all of these morphologic and functional conditions are disturbed. These must be normalized as much as possible. Only then can the orthodontically optimal result be achieved.

Aside from the morphologic picture, growth and function are the most important factors in the evaluation and treatment of malocclusions in general. Endogenous and exogenous influences work together to produce the individual case picture. Without harmony of growth, adequate function is lacking; without adequate function, there is no harmony of growth. If the orthodontist cannot count on growth, then he must be content with moving teeth.

In the case of congenital deformities, however, form is abnormal from the very beginning. This probably holds true for growth, and certainly for function. Maxillary orthopedic measures must be keyed to counter these abnormal influences. All three (form, growth, and function) are so closely interrelated that every procedure must influence them all either positively or negatively.

The surgeon can perhaps rightly say that he plays the major role in the management of clefts; he repairs the lip and palate. He has thereby corrected the form and hopes that this will make normal function possible. He is convinced (or was until only a few years ago) that through his operation he had performed the principal therapeutic procedure. All others took on secondary importance: a little orthodontics, a little speech therapy, and a little prosthetics. The influence of surgical intervention on growth is quite generously overlooked. If this is not possible, we are told once more that the particular technique is no longer being used or has been vastly improved, or that the result is due to primary growth disturbances. Perhaps this may be true in a certain percentage of cases. However, according to experience gained by conscientious follow-ups, the surgical repair of the palate is in itself the main cause for this growth restriction and continuing contracture. The earlier the operative procedure is attempted, the more we have to reckon with these possibilities. Unoperated cases have normal, even very wide, maxillae. It would be a reasonable proposal to allow for growth as long as possible before closing the cleft.

We are all aware of the fact that from the psychological and speech viewpoint, this is not possible. Undisturbed growth on the one hand and form and function on the other are two conflicting tendencies which must be weighed against each other.

McNeil (*3*) showed us a way to achieve function and still allow for growth. We have been using this method for more than 10 years, but it has been modified so that not much is left of the original method. We are, however, still grateful to him for demonstrating that maxillary orthopedic treatment on newborn infants is possible. The children accept the appliance readily and without difficulty. Thereby function is improved, swallowing and tongue position are normalized, and normal growth is made possible.

After eruption of the deciduous teeth, the orthodontist is able to influence maxillary form and attain overbite in the buccal and labial

segments. This secures the functional unity of the maxilla and mandible, which is the best assurance of harmonious growth. From the orthodontic standpoint, this is the moment to give the green light for surgical repair of the palate. Here, the orthodontist is in a position to minimize the negative effects of the operation. At this point, I would like to interject that according to our experience, delaying palatal closure until the eruption of all deciduous teeth appears to have no deleterious influence upon speech.

The eruption of the permanent incisors signals the beginning of the next phase of orthodontic activity. It consists of an evaluation of the permanent teeth as to their presence or congenital absence, and their individual positions in the alveolus. A prognosis can be made about the eruption sequence and about whether this sequence will be favorable. This phase also includes interceptive measures known as "guidance of eruption", perhaps with or perhaps without extractions. These measures are essentially the same in both cleft cases and routine orthodontic treatment. In cleft cases, however, they are much more difficult, tedious, and time consuming. They involve a wide spectrum of procedures and appliances. Included are items such as selective proximal stripping or extraction of deciduous teeth, inclined planes, and removable appliances. To these can be added forced or rapid expansion and fully banded, fixed appliances. The orthodontist must make certain that the patient receives any necessary operative dental care, including restorations and caries prophylaxis. He must coordinate the whole treatment complex to include minor surgical procedures.

During the mixed dentition period, close observation of the buccal segments is a prime responsibility of the orthodontist in his everyday practice. This is especially important and difficult in cleft patients. Here the form and position of the teeth adjacent to the cleft are frequently abnormal. During this phase of treatment, the question of secondary bone grafting also arises. This procedure should never be carried out before consultation with the orthodontist, who will often have to prepare the case for the surgeon prior to the operation. In cases of extreme growth disturbances and anomalies, the orthodontist must also be consulted for any possible presurgical or preprosthetic therapy.

We come finally to the last phase of orthodontic treatment, the forming of the permanent dental arches and the establishment of a functional intercuspidation. We must admit that sometimes we have to accept results that are, at best, compromises.

When viewed in this light, orthodontic care spans a period of time from birth until 20 years of age. During the 20-year period of care, the orthodontist is constantly involved in making timely decisions. This he may have to do alone, or in collaboration with the surgeon, the prosthodontist, or the speech therapist.

The orthodontic sphere of activity can be divided into five periods (Figure 1). They will normally overlap one another. These periods are:

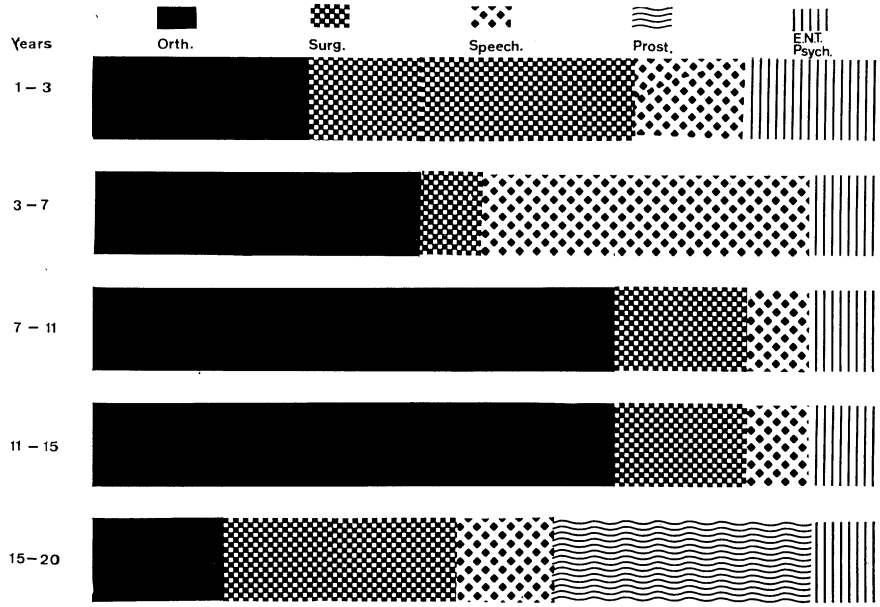

FIGURE 1. The scheme shows the role of each member of the cleft palate team according to the age of the patient. The extent of the segment of the column indicates the time and importance of the specialty.

a) pre- and postoperative orthopedic treatment from birth to 3 years, if necessary; b) early orthodontic treatment in the deciduous dentition to secure normal occlusion; c) orthodontic treatment and observation during the mixed dentition period; d) orthodontic treatment in the permanent dentition; and e) presurgical or preprosthetic orthodontic treatment in adults.

Each member of the team can decide where he fits into this scheme. Differences in treatment methods and philosophies will dictate the responsibilities of each individual. Another question might be raised as to the size of the team. Curtin (*1*) has stated that it should not be too large.

Of all the team members, the orthodontist is the one whom the patient must see most often. The orthodontic phase is the most laborious and can only be successful with the utmost cooperation and understanding from the patient and parents. The orthodontist must therefore be a psychologist. The value of utilizing good psychology, especially with the mother during those first months and years of development when the child begins to become aware of himself, cannot be overemphasized. The best psychologist for the mother is the man who appears to her to be medically and dentally competent. He is the man who can make her cognizant of her responsibilities and of what lies ahead for her fam-

ily. He can give her support and confidence by expressing what can be achieved through patience and cooperation. The waiting room of our cleft palate station, where mothers and their disfigured children in different stages congregate, makes for a unique educational assist.

This broad spectrum of responsibility implies the need for a corresponding degree of knowledge on the part of the orthodontist. Not all orthodontic schools are in a position to offer this type of training. Fixed appliances are absolutely necessary but are only part of the therapeutic armamentarium. Removable appliances, plates for rapid expansion, and functional appliances are necessary in various phases of treatment. A thorough knowledge of surgical possibilities and limitations is of paramount importance. The timing of surgical and speech therapeutic procedures must be understood. The complexities of growth and development should be mastered. And one should not forget that a background in psychology is an invaluable aid in treatment.

The orthodontist with this type of background and knowledge naturally assumes the role of cleft palate team leader. He has the diagnostic means available and the knowledge of maxillary and mandibular development necessary for performing longitudinal studies. He has wide experience in interceptive technique and mechanotherapy.

A surgeon with no knowledge of orthodontic theory and technique can still rely on the orthodontist and work with him to obtain a satisfactory result. But the orthodontist who is limited in his knowledge and has command of perhaps only one method of treatment will never become a prime member of the team. Until the eruption of the permanent teeth he can only shrug his shoulders. He has very little to contribute and is given a secondary role.

As far back as 1954, Peer and associates (*4*) wrote the following:

> We have come to believe, however, that the surgeon who is acquainted with all the implications of his procedure should be the unifying force of a cleft team,

a statement with which I cannot fully agree. But they continue as follows:

> ... but to this end he must be thoroughly familiar with the effect of his operation upon all aspects of the cleft palate problem.

With this challenge they ask more than the surgeon generally can give.

In some European countries, the cleft palate surgeon has both medical and dental training. This certainly gives him a broader perspective than the man with only a medical degree. But we cannot expect even this surgeon, after his many years of study, to seek further training in orthodontics and speech pathology. Whereas we can expect the orthodontist involved in cleft palate work to be oriented to the various surgical possibilities. What we have learned from working together with our col-

leagues in maxillofacial surgery has had a profound influence on our treatment methods and goals. And the help and information given by speech pathologists, or the questions they are asking us, have opened our eyes to problems we did not even recognize.

I could not describe the sphere of orthodontic responsibility more eloquently than did Kraus and Riedel (*2*) in their preface to *Vistas in Orthodontics:*

> Of the many clinical disciplines concerned with children and adolescents in both medicine and dentistry, orthodontics is unique in several respects. The orthodontist sees his patient regularly, perhaps at weekly intervals, throughout a one-to-three-year period. He is constantly appraising by visual examination, cephalometric film, and photographs not only the dentition, but the facial configuration of his patient during this period of diagnosis, treatment, and follow-through. The orthodontist is also acutely aware of his dependence, in both diagnosis and treatment planning, upon a knowledge of the nature, direction, and rate of skeletal growth of his patient. He is cognizant, also, of the fact that heredity has played an important role not only at time of presentation, but throughout the growth period during which he is treating the patient. Finally, he is forced to seek out and understand the manifold environmental circumstances which may have helped to bring about the condition he seeks to ameliorate and which may continue to interfere with, or perhaps aid, the treatment procedure he wishes to follow.
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> Very early in his professional career, the orthodontist becomes conscious of the dual role he must play if he is to fulfill the highest standards of his profession. He must be at once a clinician, in touch with the latest thinking concerning the technological and methodological aspects of diagnosis, planning and treatment; and at the same time he must think as a scientist, aware of, if not participating in, current research and advances in oral anatomy and physiology, growth of the head and face, cranio-facial genetics, speech and cleft palate therapy, dental anthropology, neurophysiology, and even psychiatry.

Educating such orthodontists should be the goal of every school. Only when such men are available, will they be able to coordinate the functioning of the team. They will be in a position to extract the supreme effort from each team member for the ultimate good of the patient and for the improvement of the specialty as a whole.

In conclusion, I quote a sentence of the Secretary-General of the 1969 International Congress on Cleft Palate, D. C. Spriestersbach, who wrote last year in the text *Cleft Palate and Communication* (*6*): "There is the tendency to make ourselves the focus of attention instead of the clinical problem". I apologize for having done this for the orthodontist, but I did it visualizing the orthodontist as described by Kraus and Riedel (*2*).

Summary

The treatment management of cleft lip and palate cases is dependent upon three major specialty fields: surgery, orthodontics, and speech pathology. From the patient's point of view, treatment objectives

are to look well, to speak well, and to eat well. Coordinated teamwork among the surgeon, the orthodontist, and the speech pathologist is a requisite if success is to be attained. The otorhinolaryngologist, the pediatrician, and the psychologist are also considered team members. The orthodontist is involved in the care of the patient from birth until the completion of jaw development. Of all the specialists involved in cleft palate therapy, the orthodontist must contribute the greatest number of clinical hours. He maintains the continuity of treatment and can evaluate case progress with a critical eye. He is therefore the predestined team leader. In order to satisfy the requirements for such a position the orthodontist must be well grounded in the health sciences. An understanding of embryology, pathology, psychology, and speech therapy is necessary. Obviously a command of orthodontic and orthopedic treatment methods is essential. Selected graduate orthodontic students who show interest in cleft lip and palate treatment should receive additional training in the unique problems of this complex field.

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