The Norm Concept In Dental Orthopedics

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A knowledge of the nature of the disease, not only in a qualitative but also in a quantitative sense, is an indispensable prerequisite to the treatment of any sick individual. To this end it is necessary to have some kind of standard, a norm, which will serve as a mean enabling us to measure the extent of deviations therefrom. Depending on various factors such a norm may be either relatively constant or highly variable. There is no denying that some sort of a norm concept guides the action of each individual participating in the treatment of the sick, either consciously or unconsciously.

Much has been written on the norm concept in the field of dental orthopedics. As long as the interest was concentrated exclusively on the dentition and occlusion, it was relatively easy to define a norm. The fundamental observations and systematism of Angle[2] have remained the corner stone of orthopedics till today, although the formation of a norm for even such a limited area of the masticatory organ has met with some criticism (cf. Johnson[12]).

The first attempts to apply the ideas presented by van Loon[16], Simon[23], and Hellman[10], i.e., to study the occlusion as a part of the masticatory organ and of the face, were accompanied by a definite revival of interest in the problem of norm, which now grew much more complicated. Since the employment of roentgenologic cephalometry it has been an object of constant study and an almost unlimited number of different norms have been suggested.

From time to time opinions have been expressed favoring the discarding of the norm concept with view to the existence of wide variations in the structure of the masticatory organ which render the creation of a rigorous norm impossible. In these statements strong emphasis has been placed on the significance of individuality[8, 17, 22].

Refraining from a detailed account of earlier investigations and opinions on the norm concept in dental orthopedics, I shall strive in the following to shed some light on this problem from certain viewpoints, which seem to have been heretofore somewhat disregarded.

Firstly, it must be stressed that the concepts of *diagnostic norm* and *therapeutic norm,* which need not be identical, should be kept apart for the time being. A failure to make this differentiation might totally mislead the discussion around this topic.

The *diagnostic norm* is a standard which helps us to determine the extent of deviations from the "normal" or what is considered "healthy". Such a norm can be formed in two ways, both of which have been employed:

(1) on the basis of a clinical concept of an investigator on what is "normal" or "healthy";

(2) on the basis of statistical research.

It is obvious that in the former case the norm is always subjectively coloured, while in the latter case it may be considered objecive, provided that a correct statistical method has been employed.

Before proceeding into closer examination of these two types of norms, it is necessary to point out that the evaluation of one type cannot be based on the other for the reason that they have been formed on different premises. A norm formed on a statistical basis

cannot be judged on the basis of anybody's clinical vision, nor can a clinically formed norm, however defective, be compared with a statistical norm. This is an axiom which, unfortunately, has frequently been violated.

The following facts should be observed by any judgment or comparison of norms:

(1) Is the norm objective and generally applicable?

(2) Does the norm comprise an adequate number of essential factors which constitute the "normality"?

Let us first consider the different norm types in respect to the first requirement. Clinical norms can be divided into two categories depending on whether they have been formed exclusively on the basis of clinical vision or whether they are based on statistically treated material selected by means of clinical vision. A clinical norm based on a subjective concept of structural, possibly also functional, perfection, "normality", esthetic harmony etc.[25] cannot be generally applicable.

On the other hand, if the norm is based on a subjectively selected but statistically treated material, it may have some degree of general applicability, depending on the general acceptability of the criteria used in selection (cf. Margolis[18]). The general applicability of the norm is obviously more limited if esthetic factors have been decisive in the selection of the basic material than if the criterion has been e.g. "normal occlusion" (cf. Downs[7], Koski[14]), concerning which there are no significant differences of opinion[13].

Statistical norms are always generally applicable and objective in respect to populations equivalent to the basic material, provided that the basic material has not been deliberately selected and that correct statistical methods have been employed (cf. Bjork[4]). The general applicability of a statistical norm may naturally be limited by factors like sex, race, etc.

A comparison of a clinical and a statistical diagnostic norm reveals one more important point. The quality of clinical norms may be influenced by prevalent esthetic and even social factors, such as the belief that the so-called bimaxillary prognathism is abnormal in an individual of the white race, and alike. In such cases the norm is dependent on secondary temporal factors. A *statistical norm,* on the other hand, is dependent on evolutionary factors, i.e. the outcome of natural evolution, being thus *more biological* and frequently also more conservative than a clinical norm.

On the basis of the foregoing all norms formed on the basis of clinical vision alone, with no statistical treatment, can be eliminated as non-acceptable. From the remainder, statistical norms should be given precedence on logical grounds, but we shall see later on that even clinical-statistical norms may have some, at least temporary, justification.

Let us now proceed to the question of what constituent quantities a norm should include in order to contain a sufficient number of factors essential to normality. It seems obvious that this question is crucial for the problem of the possibility of a norm.

Considering that none of the norms heretofore presented for the masticatory organ as a whole has been generally accepted, it seems evident, that no satisfactory basis has been found so far for the composition of a norm. Up till now the formation of norms has rested on more or less haphazard experiments. Our insufficient knowledge of the interdependence of the different parts of the masticatory organ[6, 15] has hampered the selection of the most essential quantities for the creation of the norm (cf. Washburn[26]).

The answer to the question is, therefore, that we do not know what the factors are, and we are not even sure of the existence of such factors. Accordingly, it seems senseless to discuss the "pro and cons" of this problem of which we have no definite knowledge, in the way it has been frequently done in the past.

So far, most norms have been static ones relating to the bony structures. Obviously such norms cannot be fully satisfactory. Recent studies have placed strong emphasis on the significance of soft tissues both to the bony structures and to the functioning of the masticatory organ[3, 5, 9, 21].

It appears to be time for a systematic analysis of the masticatory organ with a view to determining not only the static correlations of hard and soft tissues but also the dynamic relationships existing within the masticatory organ. The objective of such an analysis should be to find out whether any of the potential interrelationships existing within the masticatory organ could be used as a basis for the creation of a generally acceptable and objective norm or possibly several norms, each of which would be applicable with respect to a certain race, type of face etc. The problem is extremely complicated and calls for the employment of highly elaborate methods of research, examples of which have already been introduced in the literature[1, 11, 19, 20, 24].

In the writer's opinion this analysis should be performed along two main lines. Considering that a statistical norm is most widely applicable, unselected material should be investigated with a view to the possible existence of internal correlations within the masticatory organ, and a statistical norm or norms should be formed on this basis, if possible. On the other hand, "normal occlusion" would also be a good starting point, being the only generally accepted norm within the masticatory organ and an object of general interest for therapeutic reasons. In this latter case the basic material for study should be composed of individuals with "normal occlusion" (clearly defined) and without any further selection. For both lines of investigation adults with fully developed masticatory apparatus would be best suited, in the first place. After having thus determined the possible internal correlations within the masticatory organ, a further study should be conducted to find out what phenomena during the growth and development may affect these correlations and the norm.

Though the foregoing primarily concerns the diagnostic norm, it may, on certain conditions, also apply to the *therapeutic norm.* A therapeutic norm is the *basis of treatment.* As stated before, it is necessary for time being to keep it apart from the diagnostic norm for the simple reason that none of the norms heretofore presented has been fit for use as a therapeutic norm. Ideally, a norm should naturally be of double significance.

Especially as regards the therapeutic norm, the supporters of the "individualism" seem to be in the majority. Indeed, the idea of a norm and its significance seems much more feebly grounded in connection with the therapeutic norm than from the point of vew of diagnostics. Regardless of criteria, it is obviously much easier to decide that a masticatory organ diverges from the "normal" than to try to remodel it to conform with a certain norm.

Nevertheless, we may presume with fair certainty that a generally applicable diagnostic norm, if at all possible, will also have a general, or nearly so, applicability as a therapeutic norm. Theoretically it seems difficult to think of a generally applicable diagnostic

norm, even with restrictions regarding race, facial type etc., unless sufficient notice has been taken of the quality of individual structure so as to provide the necessary directives for treatment in each individual case. In other words, a norm may be generally applicable only on the condition that there exist regular internal correlations within the masticatory organ which are constant at least with regard to relatively large though somehow restricted groups. Thus the problems of a therapeutic norm is closely tied with that of a diagnostic norm.

With view to the structural and functional variations many investigators are at present inclined to think that it will prove impossible to create a norm or norms for the total structure of the masticatory organ, not to speak of its functions. It is quite possible that a detailed analysis of the kind suggested above will merely confirm the existence of the only true norm we have had so far, i.e. the "normal occlusion". And indeed, from a therapeutic point of view such a result might be satisfactory. However, the general orderliness of nature (naturally allowing for common variations) and the rather close structural-functional synchronization of the different parts of an organism seem to suggest that there may exist certain basic regularities or norms also within the dento-facial complex, which might be discovered through more systematic and diversified effort than heretofore.

From the foregoing it can be concluded:

(1) that in the field of dental orthopedics there exist, at present, several norms for the masticatory organ, which are diagnostic of their nature and not generally applicable;

(2) that of the different types of norms the statistical norms are objective and acceptable in principle, while norms based exclusively on clinical vision are not acceptable;

(3) that the question of the possibility of a generally applicable norm has not been studied scientifically, and that an extensive analysis of the structure and function of the masticatory organ should be performed with due attention to the effects of growth and development;

(4) that the possibility of a therapeutic norm will be clarified in connection with such an investigation and that a generally applicable norm, if at all possible, may be presumed to have both diagnostic and therapeutic significance.

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