

# Acceptable Deviations In Normal Dentitions

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## INTRODUCTION

When planning treatment for an orthodontic case one keeps in mind an "ideal normal". However, perfect correction in the sense of an ideal normal is often impossible and often impracticable. In view of this, one accepts certain deviations from the ideal normal or, in other words, aims for an "acceptable normal". To what extent these deviations may be accepted depends upon the existence of these deviations amongst acceptable normal dentitions in nature, where one would not consider orthodontic treatment necessary because aesthetics and function are not impaired to the extent of warranting orthodontic treatment. Certain limitations due to genetic, environmental and mechanical factors may compel one to concede acceptance of slight deviations from the abstract ideal normal. It is not, however, suggested that one should do less than the maximum possible for each patient. For a conception of the usage of normal in medicine or dentistry, one is referred to the excellent exposition by Dahlberg.<sup>1</sup>

The objective of this study is, therefore, to evaluate the occurrence of some of the "acceptable deviations" such as amount of overbite, amount of overjet, anterior crowding, spacing and rotations, posterior crossbite, inclination

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of canines and occlusion of canines among normal dentitions.

## MATERIAL

One hundred Indian males, mostly University students, aged between 18 to 30 years (mean age  $25.3 \pm 0.97$  years) were selected according to the fulfillment of the following criteria: (1) normal occlusion which, in our opinion, did not warrant orthodontic treatment, (2) good facial development presenting a pleasing appearance and profile, (3) presence of all teeth (third molars not considered), and (4) normal gingival condition and very low caries prevalence.

## METHOD

Alginate impressions of the selected cases were taken and the casts made in stone plaster. The following observations were made on the casts.

(1) *Overbite* The upper and lower casts were placed in proper occlusion and viewed from the front, holding them such that the occlusal plane was level with the author's eyes. To aid this a safety-razor blade fitted with a wooden handle was held below the upper incisal edges parallel to the occlusal plane. The edges of the blade formed a thin line parallel with the occlusal plane as shown in Fig. 1. A fine horizontal scratch was made with the blade on the labial surface of the lower right central incisor. The overbite was then measured from the scratch mark to the incisal edge of the lower right central incisor by means of a pair of spring-loaded dividers.

(2) *Overjet* This was measured by means of a narrow scale marked in

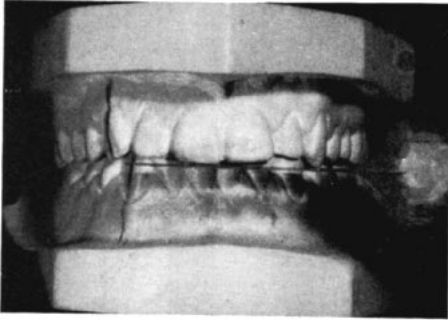


Fig. 1 Method of paralleling blade edge with the occlusal plane and recording overbite.

millimeters. The measurement was taken from the scratch mark on the lower right central incisor to the incisal edge of the upper right central incisor. In cases showing some attrition of upper incisal edge, the measurement was taken up to the middle of the attritioned edge.

(3) *Crowding* This refers to slight crowding or imbrication in the upper or lower incisor region. The maximum crowding accepted in this study is shown in Fig. 2.

(4) *Spacing* This refers to slight

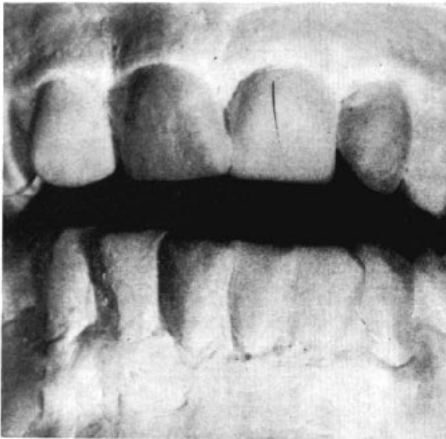


Fig. 2 Maximum amount of "slight crowding" of incisors acceptable in this study. Also note amount of rotation of  $\frac{2}{2}$  acceptable.

spacing in the upper and lower incisor regions. The maximum spacing accepted in this study is shown in Fig. 3.

(5) *Crossbites* This refers only to posterior teeth and where the crossbite was functional.

(6) *Canine inclination* Angle of inclination of the upper and lower right canines in relation to the occlusal plane was measured by means of an instrument consisting of a wooden platform (10 x 7 cms.) fitted with a flat steel strip on one edge. The strip could swivel and record the angulation between it and the platform. The canine axis was marked with a pencil on the cast. The cast was then placed with its occlusal surface on the platform and the steel strip adjusted to coincide with the marking on the canine, thereby giving its angulation with the occlusal plane (Fig. 4). The inner angle between the canine and the occlusal plane was read with a celluloid protractor (Fig. 4).

(7) *Canine occlusion* This was checked on both sides and determined whether it was completely normal, when the upper canine articulated along the distal slope of the lower ca-

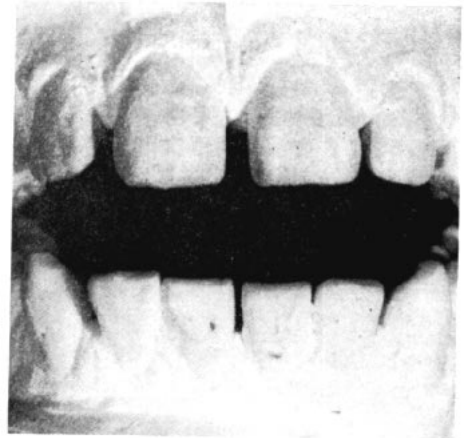


Fig. 3 Maximum amount of 'slight spacing' of incisors acceptable in this study.

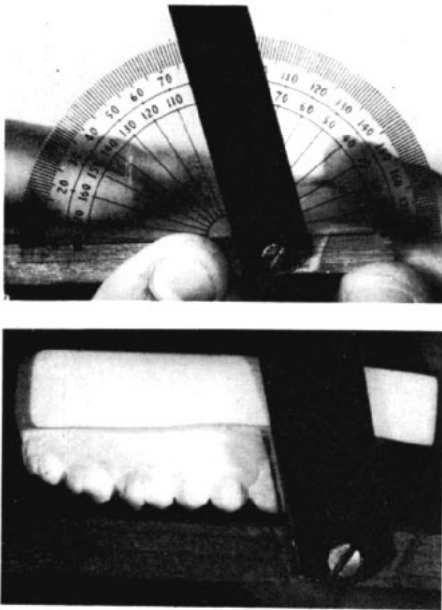


Fig. 4 Method of recording canine angulation.

nine, or cusp to cusp, when the cusp of the upper canine overlapped the cusp of the lower canine (Fig. 5).

(8) *Eruptive heights* The eruptive heights (crown lengths) of the right central incisors and right first molars were recorded only as a matter of interest to see whether clinical eruptive heights of these teeth have any bearing upon overbite.

### RESULTS

(1) The mean overbite was 3.2 mm with a S.D. of 1.65 and a range of 0.0 to 7.5.

(2) The mean overjet was 2.4 mm with a S.D. of 1.07 and a range of 0.5 to 5.5.

(3) Slight crowding occurred in the upper incisal region in 28% of the cases, in the lower incisal region in 54%, and in both arches in 22%.

(4) Incisal spacing was found in

both arches in 11% of the cases, in the upper arch in 23%, and in the lower in 16%.

(5) Nine of the one hundred cases showed crossbites in the posterior region, only one of which occurred in the molar area.

(6) The mean inclination angle of the upper canine was 82.81 degrees with a S.D. of 4.93; the lower canine angle averaged 88.03 degrees with a S.D. of 5.79.

(7) The canine occlusion was normal in fifty cases, and cusp to cusp on one or both sides in the remaining.

(8) The eruptive heights can be seen in Table I.

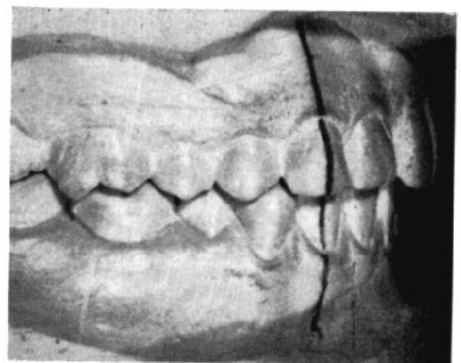
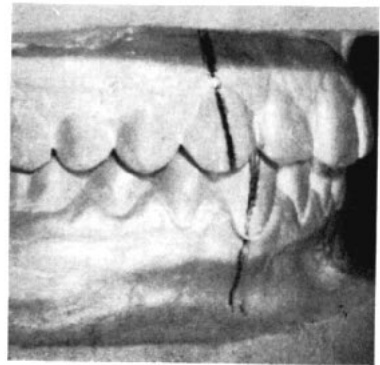


Fig. 5 Normal canine relationship, above. Cusp to cusp canine relationship below; note the good occlusion of posteriors.

TABLE I  
Clinical eruptive heights (mm).

Tooth	Mean	S.D.	Range
$\frac{1}{1}$	9.60	1.07	6.5-11.5
$\frac{1}{2}$	7.90	1.25	4.0-11.5
$\frac{6}{6}$	5.72	0.71	3.5- 7.0
$\frac{6}{7}$	5.55	0.60	3.5- 7.0
Total incisor	14.79	2.34	9.0-20.5
Total molar	10.89	1.17	11.0-14.5

### DISCUSSION

The fairly wide range of overbite and overjet showed no statistical correlation with clinical eruptive heights of the teeth, total incisor height, or total molar height. This is in agreement with the findings of Bolton's<sup>2</sup> study of casts of fifty-five patients with excellent occlusions where a significant coefficient of correlation could not be found when the degree of overbite was related to incisor length or to tooth size via the anterior ratio. This shows that the problem of overbite and overjet is not just one of tooth elongation, but involves the alveolar process and basal bones.

The mean incisor overbite of 3.2 mm when compared with the mean lower incisor clinical eruptive height of 7.9 mm shows that the lower incisor coverage in overbite is about two-fifths. This being so in young adults, it may be expected to be slightly more in children. Also, since all these cases were normal and showed no obvious clinical periodontal damage, there is reason to believe that quite a wide range of overbite and overjet is tolerated within healthy limits.

Slight crowding and spacing was quite frequently encountered in the incisor region and the fact that the cases were caries-free, had normal gingival

condition, and were aesthetically and functionally good suggests their acceptance to some degree.

Rotations of incisors were noticed less frequently and among them the upper laterals formed the highest quota. It has been shown by Avinash Chander<sup>3</sup> that among Indians the upper laterals are much wider in comparison with European races. However, the lower percentage of rotations leads us to believe that correction should be undertaken to conform to more acceptable normal standards. Posterior crossbites were noticed in nine cases only and cannot be accepted as normal and, therefore, call for correction. It must be conceded that functional crossbites do exist and have to be judged on their own merits.

The axial inclination of canines to the occlusal plane shows that the upper canine is usually more mesially inclined than the lower canine. Figure 6 shows the mean and two S.D. limits of upper and lower canine inclination; even vertical upper and distally tipped lower canines are quite stable in nature and within acceptable normal limits. Only one-half the cases showed perfect, textbook upper and lower canine occlusion or relation, and the rest showed either one or both sides cusp to cusp relation of canines. In the latter case the occlusion posterior to the canines was quite normal, there being no forward drift of the posteriors, suggesting a possible discrepancy in the size of the upper and lower teeth. This shows that even after completion of treatment, quite commonly, vertical or distally tipped canines and cusp to cusp relation of canines may be accepted as quite stable and functional.

Therefore, although one may strive for an ideal normal result, yet practical limitations and also the existence of acceptable deviations in normal dentitions will have an important bearing on

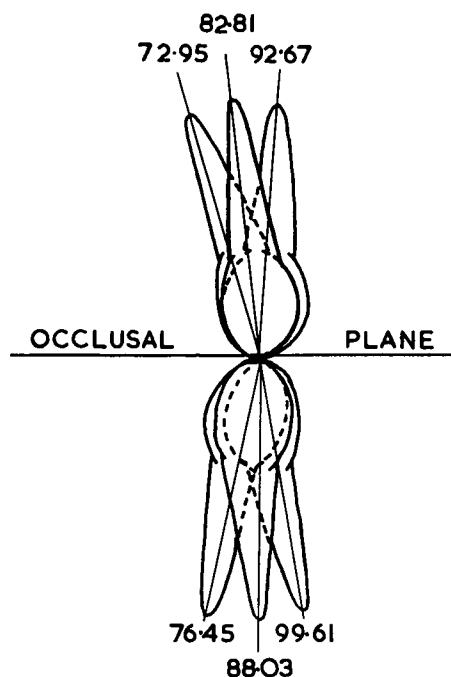


Fig. 6 Diagram showing angle of inclination of upper and lower canines to occlusal plane. The mean and two S.D. limits are shown.

the results obtained. Quite often, experienced orthodontists, on completing a case and having done the best possible for the patient, have remarked that a particular minor deviation could be safely accepted. This paper deals with some aspects of acceptable deviations; admittedly there are many more, especially in cases involving mutilated dental arches due to loss of teeth and also in cases showing disproportion in bone and tooth size.

#### SUMMARY

1. Casts of one hundred Indian male adults (18 to 30 years) with normal occlusion and facial appearance were studied to evaluate the extent of "acceptable normal" overbite, overjet, slight incisor crowding—spacing and rotations, posterior crossbites, canine inclination and canine occlusion, as

compared with ideal normal.

2. In overbite nearly two-fifths of the lower incisor was covered by the upper incisor. There was no correlation between overbite and clinical eruptive heights of incisors or molars.

3. Incisor crowding and incisor spacing were noticed within acceptable limits.

4. The low percentage posterior crossbites precludes them from being normally acceptable.

5. Canine inclination to occlusal plane showed that fairly vertical upper and even distally tipped lower canines were within reasonable limits of acceptance. The high percentage of cusp to cusp canine relation and only one-half textbook canine relationship shows the stability of canines in cusp to cusp relation.

6. It has been suggested that although one should strive for correction according to "ideal normal", it is sometimes impracticable; therefore an "acceptable normal" with knowledge gained from studying normal dentitions should be considered.

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